DOCUMENT RESUME

ED 129 624 SE 021 493

AUTHOR Larkin, Robert P.; Schoenstein, Roger
TITLE How to Teach Map and Compass Skills.
INSTITUTION National Science Teachers Association, Washington, D.C.
PUB DATE 76
NOTE 13p.; Contains occasional small type
AVAILABLE FROM National Science Teachers Association, 1742 Connecticut Avenue, N.W., Washington, D.C. 20009 (Stock Number 471-14704, $0.60 prepaid)

EDRS PRICE MF-$0.83 Plus Postage. HC Not Available from EDRS.
DESCRIPTORS College Science; Elementary School Science; Elementary Secondary Education; *Geography; *Geology; *Maps; *Map Skills; Science Education; Secondary School Science

ABSTRACT

Described are instructional aids for teaching map and compass skills. Included are details on eight exercises on map skills and five exercises on compass skills. Most exercises are offered as games including techniques for varying the game difficulty to make each suitable for students from elementary through college level. (SL)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

NATIONAL SCIENCE TEACHERS ASSOCIATION

how to...

ED129624

TEACH MAP AND COMPASS SKILLS

Robert P. Larkin, *Department of Geography, University of Colorado, Colorado Springs, Colorado*

Roger Schoenstein, *North Junior High School, Colorado Springs, Colorado*

INTRODUCTION

Students can learn map and compass skills through a series of activity-oriented games. This guide to teaching such skills includes map games and exercises, activities to teach compass skills, and an introduction to the sport of Orienteering.* Teachers can use these activities within the classroom or in parks and wooded areas.

This group of exercises has been developed to help teachers and others teach map and compass skills in a way that is both educational and fun. Only some of the many games and exercises to teach map and compass skills are included here; many of the basic exercises can be modified or adapted to suit individual needs. Most of the activities included have been used successfully with both secondary and college students; they can be made as simple or as complex as desired by adapting the materials to the level of sophistication of the students.

The use of map and compass in an experiential activity has applications for many grade levels and disciplines. Youngsters in the third and fourth grades, playing these games in a schoolyard, can learn mathematics and physical sciences. At the junior high and senior high school levels, physical science teachers can easily relate classroom activities to outdoor map and compass exercises. Cognitive skills in areas such as geography, geology, biology, environmental studies, and mathematics can be presented as an outdoor experience. For example, a good understanding of topographic maps is essential in understanding weathering and erosional processes in geology or earth science classes. Those who have developed map and compass skills can recognize landscape features and processes from a topographic map, and locate and map plant communities relative to landscape features or other ecological variables.

At levels above secondary education, the same games and exercises can be adapted to the ability of the students. In addition to formal academic relationships to classroom activities, map and compass skills can be presented for survival training, leisure time activities, physical fitness, and other non-academic applications.

*Orienteering is a coined word, registered in the U.S.A. and Canada for services rendered and products distributed by Orienteering Service, Box 547, La Porte, Indiana and by Canadian Orienteering Services, 446 McNicolls Avenue, Willowdale, Ontario.

THE TOPOGRAPHIC MAP

Most people are not familiar with the topographic map; they usually associate it with a road map. There are, however, some rather important similarities between the two. Both kinds of maps convey some information about the real world; they are both printed at some greatly reduced scale; and both use symbols to represent real objects on or near the surface of the earth.

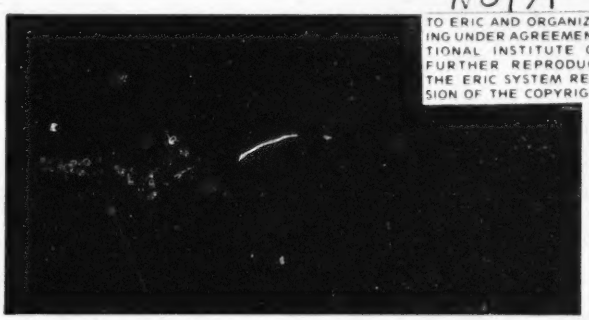
The distinguishing characteristic of a topographic map is the portrayal of the shape and elevation of the terrain. The road map plots position and distance of cities and roads; the topographic map concentrates on the physical features of an area. Topographic maps record the physical characteristics of the terrain, as determined by precise engineering surveys and measurements, in convenient, readable form. They show the location and shape of mountains, valleys, and plains; the network of streams and rivers; and the principal works of man including roads, towns, boundaries, and buildings. A road map shows the shortest route to take from one town to another; the topographic map shows what the terrain in between is like, including steepness, distance, kind of vegetation, and significant hydrologic features.

Teachers interested in learning more about topographic maps can obtain an informative booklet from the United States Geological Survey entitled "Topographic Maps." The booklet discusses many elements of topographic maps such as map scale, map symbols, mapping procedures, map revisions, as well as information on ordering maps for classroom use. The booklet is well illustrated and can be obtained free of charge by writing to the Map Information Office, U.S. Geological Survey, Washington, DC 20242.

"PERMISSION TO REPRODUCE THIS COPYRIGHTED MATERIAL BY MICROFICHE ONLY HAS BEEN GRANTED BY

NSTA

TO ERIC AND ORGANIZATIONS OPERATING UNDER AGREEMENTS WITH THE NATIONAL INSTITUTE OF EDUCATION. FURTHER REPRODUCTION OUTSIDE THE ERIC SYSTEM REQUIRES PERMISSION OF THE COPYRIGHT OWNER."



SE 021 493

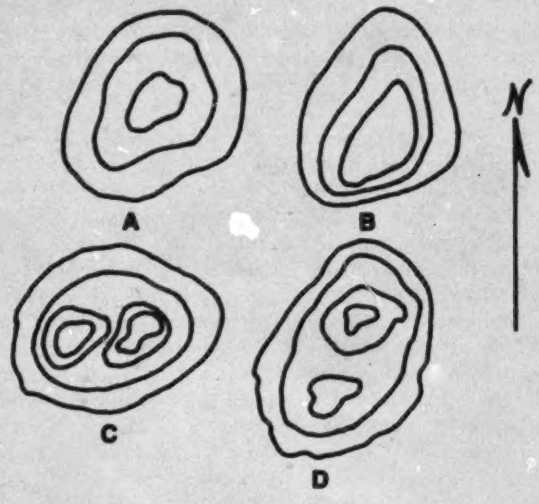
MAP SKILL EXERCISES

Matching Verbal Descriptions and Contour Lines[1]

This first exercise was designed to help students understand the nature of contour lines. It is a simple exercise that can include a variety of contour line figures and verbal descriptions. The object of the exercise is to match the verbal description with the appropriate contour line figure. (Figure 1)

The figures shown are a rather simple application of the concept; however, other contour lines and verbal descriptions can be developed to the level of difficulty required. As a variation of this exercise, have individual students, or groups of students, draw contour lines and descriptions and have them trade with other students to see if they can match up contour lines and verbal descriptions developed by others.

[1] Adapted from *Your Way with Map and Compass* by John Disley. Canadian Orienteering Service, 446 McNicolls Avenue, Willowdale, Ontario. 1973.



1. Is a round hill with two summits
2. Has a steep southern side
3. Has gentle uniform slopes
4. Has two summits—the northern one is higher

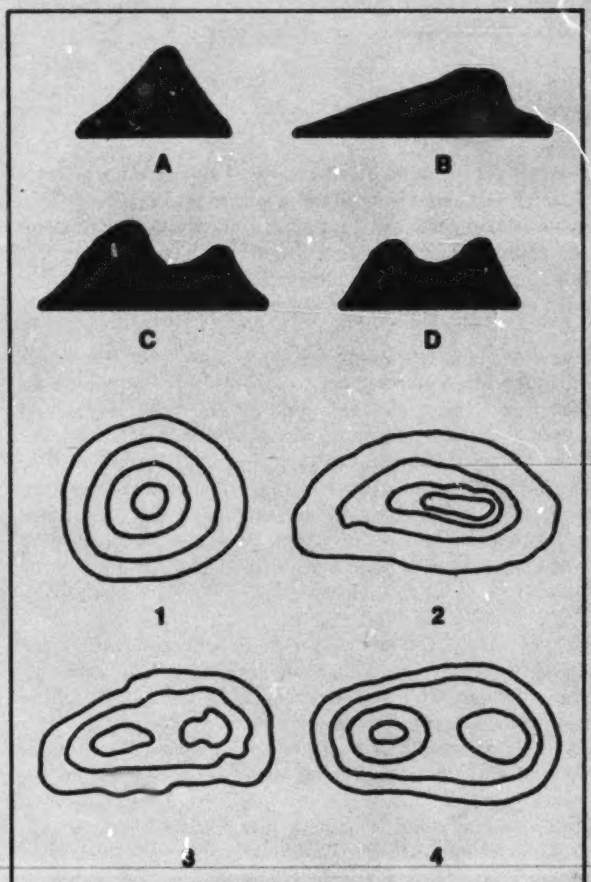
Letter	Number
A	
B	
C	
D	

Figure 1

Pairing Lines and Profiles[2]

Like the first one, the purpose of this exercise is to develop skills in interpreting contour lines and their relationship to surface features. This is done by matching the contour lines with the appropriate cross-section diagram. (Figure 2) It is a good way for students to get a feel for the relationship between contour lines and landscape elements. Students can develop their own profiles and contour lines in this exercise as in the previous one.

[2] Ibid.



Letter	Number
A	
B	
C	
D	

Figure 2

Pairing Contour Maps and Cross-Sections[3]

Another exercise concerned with contour lines and cross-sections involves pairing cross-sections with lines drawn on actual contour maps. (Figure 3) After drawing the lines on the map, one has to imagine that you can cut down through the contour lines and see a cross-section of the terrain. The object of the exercise is to match the line drawn on the map with the appropriate cross-section. This exercise has endless possibilities as a self-study learning experience. Give students a topographic map and ask them to draw lines on the map and make a drawing of the cross-sections involved. They can then exchange maps and try to match up the lines and cross-sections developed by other students.

[3]Ibid.

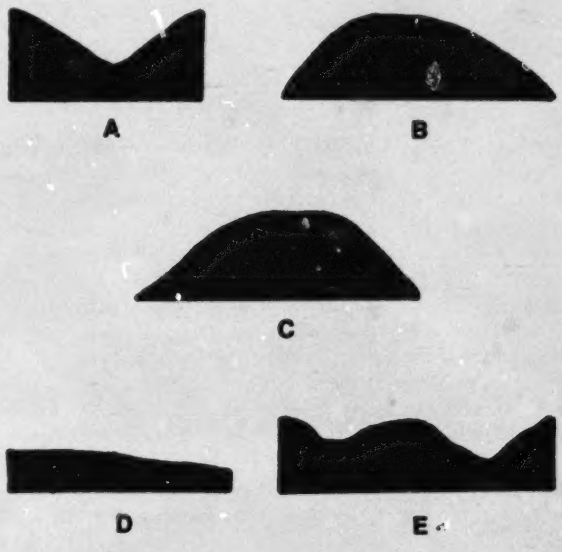


Figure 3

Letter	A	B	C	D	E
Number					

Outline the Square Game[4]

The basic idea behind this game is simple and many varieties of the game can be developed. Divide a classroom into groups of three or four students. At the end of the classroom, or out in the hall, post a group of master maps with three or four squares drawn on them (Figure 4), one for each group of students. Provide students with maps that do not have the squares drawn on them. The students line up in groups, and on an appropriate signal the first students leave the starting area and go to the master map set aside for their group. The student has to concentrate on the map and the position of the first square on the map. When the student thinks he or she knows the position of the square on the map, he or she returns to the starting area and draws the square on the group map. The student cannot bring the master map back to the starting area in order to draw the square, but has to draw the position of the square from memory. If the first student forgets the position of the square, he or she can go back to the master map as many times as necessary. After the first student is finished, the second student goes to the master map and draws the position of the second square on the group map. This process is repeated several times, depending on the number of students in the group and squares on the map.

The winner is the group that finishes the quickest with the least number of mistakes. Many times the group that finishes first is the least accurate; the group that took more time ends up the overall winner.

Many varieties of this game can be developed. For example, use figures of any shape and number of sides instead of squares. This, of course, adds to the difficulty. Or, instead of having each student draw the whole square, have him or her draw only one side of the square; the group as a whole works on each square to complete it.

This exercise develops many skills that are appropriate for an understanding of topographic maps. The students must look closely at the contour lines and the relationship between lines. This game has been tried many times with a great deal of success. Students like the competitive aspect of the game and usually end up cheering and encouraging their group members to win.

Fill-In-the-Square Game[5]

This exercise is similar to the previous one and can use the same squares developed for that game. (Figure 4) The purpose of this game is to thoroughly analyze the nature and number of contour lines in the square. Place the same master map on one side of the classroom, and divide the students into groups of three or four, depending on the number of squares on the map. The students line up in groups, and a signal is given to start. The first student goes to the master map, looks at the first square, and then returns to the starting area. On a blank sheet of paper, he or she draws a square of the approximate size of the one on the master map and also draws in the contour lines and cultural features as they were on the master map. The student can return to the master map to refresh his or her memory as many times as necessary.

[4]Adapted from *Learn Orienteering*. Canadian Orienteering Federation, Box 6206, Terminal A, Toronto. 1973.
[5]Ibid.

Figure 4

After the first student completes his or her square, the next student goes to square number two. This process is repeated until all the squares are completed. This game is scored on both speed and accuracy.

Many variations of this game can be developed depending on the sophistication of the students. Obviously, for beginning students, the number and complexity of contour lines in the squares should be kept simple. However, as students develop more skill, make the squares more complex by adding roads, houses, and other cultural features. Another variation of this game, as in the previous exercise, is to change the shape of the figures from squares to other geometrical designs. An even more exciting modification of the game is to have a student go to the master map and study it. Then, when he or she returns to the starting area, he or she has to tell another student what was in the square and that other student has to fill in the square. This modification develops communication skills relative to topographic maps and is a great deal of fun to participate in or observe.

Circle Route Game[6]

This game develops several skills necessary for interpreting topographic maps and using maps for Orienteering. As in the previous game, divide the class into groups and have them line up in a starting area. Master maps (Figure 5) are placed across the room or in the hall with one master map for each group of students. The master maps have an Orienteering course outlined on them. (Orienteering will be discussed in more detail in the final section.)

[6]Adapted from *Orienteering Map Memory Game*. Canadian Orienteering Service, Willowdale, Ontario. 1975. Master maps and blank maps are available from Orienteering Service, La Porte, Indiana.

The Orienteering course outlined on the map consists of a starting area (triangle), seven control points denoted by small circles and numbered one through seven, and a finish area denoted by a double circle. The first student goes to the master map and looks for the starting area (triangle). When he or she finds the triangle, he or she must accurately memorize its position and return to the starting area. At the starting area each group has a map identical to the master map, but it does not include the outline of the Orienteering course. The first student must draw the triangle in the appropriate position on the map for his or her group. The student is allowed to return to the master map as many times as necessary. After the first student is finished, the second student goes to the map and studies where the first control point is located (circle number one) and then returns to the starting area to put the circle on the group map. The next student then finds control point number two and this whole process is continued until the group map has all the control points and the double circle denoting the finish.

This exercise is scored on both speed and accuracy. Many skills relative to topographic maps and Orienteering are developed with this exercise. The students must read the map closely and remember the relationship between contour lines and cultural features on the map. When a person is actually walking or running around an Orienteering course he or she cannot constantly look at the map, but must remember where certain topographic and cultural features are located. This exercise is extremely effective in developing that skill.

A Walk on the Map

This is a useful exercise because it combines many of the skills needed to interpret topographic maps. The Orienteering course outlined (Figure 5) could be used as a basis for the map walk exercise. The students describe the terrain and cultural features they would encounter as they walked around the Orienteering course, assuming they would walk a straight line between control points. For example, if one were to describe the terrain and cultural features encountered on a walk from the starting point of the Orienteering course to control number one it would be something like this:

The starting point is near the base of a hill. As you proceed north toward the first control you have to cross a broad, relatively flat flood plain. You then cross the stream and on the northern side of the stream start to ascend a steep hill. It then levels off for a little distance before you start to descend and as soon as you start going down you have to cross a dirt road. After continuing down for a short distance after the road, the control point is near the top of a valley that runs in a northwest direction.

Figure 5

The above example is a description of only one leg of the Orienteering course. Within the individual groups of students, each student could take a leg of the Orienteering course and describe the landscape and cultural features. Another method would be to set up a fill-in-the-blanks exercise. For example, if one were to take the first leg of the Orienteering course described above, the exercise could read:

We start walking in a(n) (Northeast) direction. The first major physical barrier to be encountered is a(n) (stream). After we cross the stream we are quickly confronted by a(n) (steep hill) that must be ascended. As we walk up the steep hill we can look to our immediate west and see a(n) (valley). We keep going up for a short distance and then start to descend. Almost at once we have to cross a(n) (road). After we cross the road it is only a short distance to the control point which is found in a(n) (valley).

The above procedure can be used with almost any map. For an interesting variation, the students themselves can develop the fill-in-the-blank questions and give them to other students.

Imaginary Map Game

The purpose of this exercise is to develop a general understanding of how map symbols relate to each other and, depending on the complexity of the imaginary map, many other map skills can be developed. Essentially, the imaginary map game involves the technique of taking a verbal description of a map and translating that information onto an actual map. The map shown (Figure 6) is an example of an imaginary map drawn from the following description:

The Grand Lake Region

The river Platte flows from the northeast to the southwest. It has rapids in its upper reaches and empties into Grand Lake in the southwest part of the map.

A paved highway running east-west crosses the river (bridge) just below the rapids. Just north of the bridge on the west side of the river is a farm with a large barn.

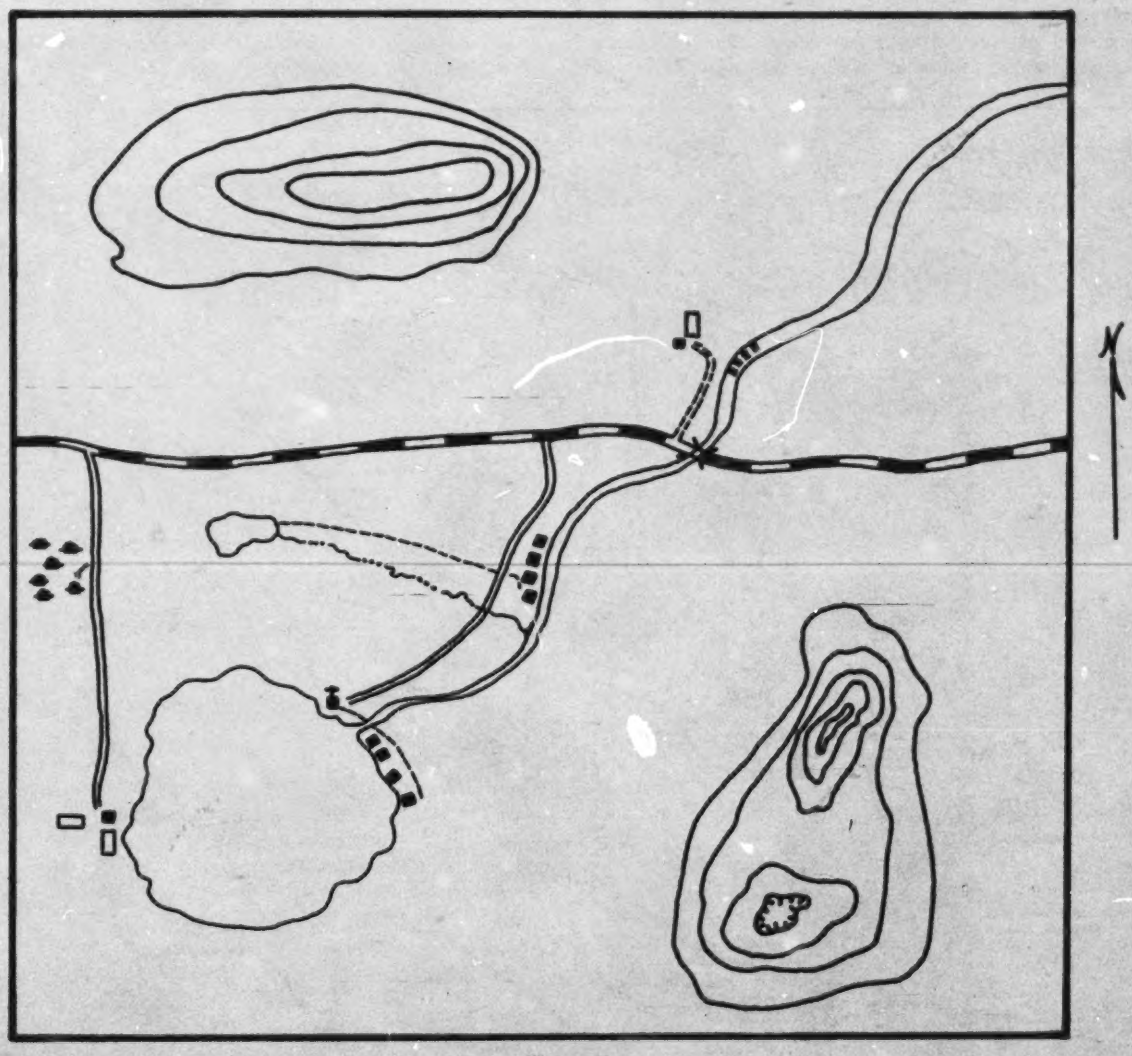


Figure 6

An unimproved dirt road leads from the farm along the river to the paved road.

South of the highway, on the west bank, is a small settlement with four houses along the river. A dirt road runs along the river from the lake to the highway with the four houses between this road and the river. Down at the lake, where this road ends, is a church.

East of the church and along the shore of the lake are several summer cottages. A trail is running from the easternmost cottage, passing the other cottages, to the church.

South of the paved highway and directly north of Grand Lake is a small lake. From it a small intermittent stream flows southeast where it joins the river Platte near the settlement with four houses. A trail leads from this lake to the settlement.

At the west end of Grand Lake is a farm with two large barns. A dirt road leads north to the paved highway. About three-fourths of the distance to the paved highway is a swamp on the west side of the road.

In the southeast corner of the map, east of Grand Lake, is a hill with two summits. The northern summit is higher than the southern one. The southern summit, however, has a crater or depression at the top.

In the northwest portion of the map, north of the paved road, is a hill trending east-west with a steep eastern slope.

There are several ways to use the imaginary map game. The description of the map can be read to the students very slowly and they can draw the map as the description is being read. Another method is to give students copies of the description and let them draw the map at their own pace. It is always interesting and exciting to have students compare maps when they are finished.

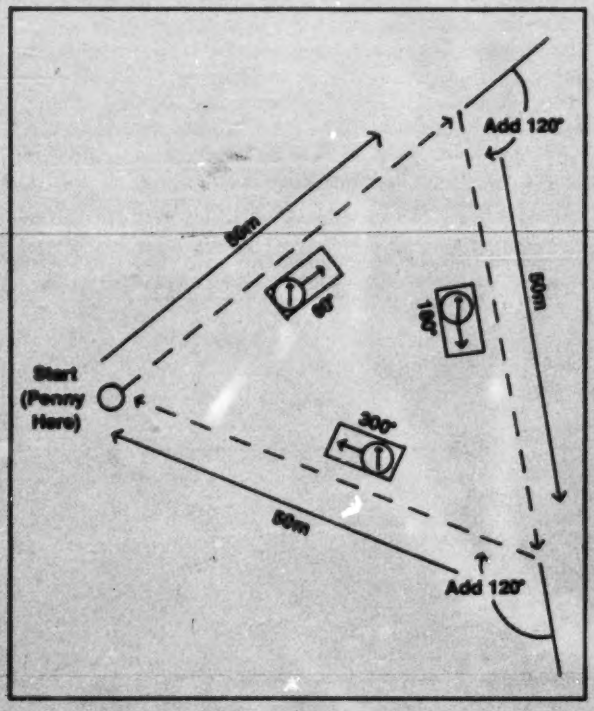


Figure 7

COMPASS GAMES

In teaching compass skills, the instructional sequence can be rather important. The games presented in this section are in their teaching order, and that order should be followed for maximum clarity and ease of teaching. The games are designed for use with a compass with a rectangular baseplate and a moveable compass housing, like the Polaris (Type 7) by Silva Company. This compass is inexpensive, accurate, durable, and well-suited to use by elementary and secondary students. Other compasses which could be used are the Suunto RA-66 and the Wilkie M-111.

The very basic compass skills can be taught inside or outside, but a schoolyard, park, or open field is more fun for the students. How the compass works, how to read a bearing, what the red needle points to, and other basic operations are explained as quickly as possible. The three operations to be concentrated on in the first session are setting, taking, and following bearings, in that order. Setting a bearing is nothing more than setting the compass housing to a bearing given by the teacher. For students well familiar with the 360° of the circle, problems such as "Set your compass at 455°" can prove interesting. (Obviously, 455° is equal to the full 360° of the circle, plus an added 95°; so the bearing is 95°.)

Following bearings is simply heading in the direction indicated by whatever bearing the teacher gives. Any suitable landmark or object can be used: "What object is at a bearing of 45°?" "If you were to walk at a bearing of 234° for 100 meters, what would you find?"

Taking a bearing is a related, yet different operation. Often at about this point someone will ask, "This is easy, but where are these bearings coming from—out of your head?" This is the time to explain the process of taking a bearing. Again, nearby buildings or other features can be used: "What is the bearing to that tall tree?" "What is the bearing you would follow to walk from here to the library?" The emphasis here is on how to take a bearing from an object—that's one place where bearings come from.

The Triangle Game[7]

In the triangle game, the student is concerned only with a given set of bearings (directions) to follow. The emphasis is on compass use, not on distance or map skills. As shown in Figure 7, the student picks a spot in an open field or meadow, marks it with a penny or some small marker, and then follows a triangular course arriving back, hopefully, at the marker in the grass. Say, for example, students start with a bearing of 60°. They walk 50 meters, or any distance at that bearing, and stop. They add 120° to the original bearing, walk that same distance as in the first leg, and stop again. After repeating this process the third time, they have described an equilateral triangle, and are back at the starting point. Using a quarter (provided by the student) makes the game a bit more interesting, as does using more complex figures than a triangle. By adding 90° on each of four legs, a square is described. Likewise, add 60° for six legs, and so on. The more legs, the harder the game. For younger children, larger colorful discs could be used to make the game easier and insure success.

[7]Adapted from *Be Expert With Map and Compass* by Bjorn Kjellstrom. Charles Scribner's Sons, New York, N.Y. 1975.

The Compass Rose Game[8]

Figure 8 shows a sample set-up for the compass rose game. A center stake is used, and eight stakes are set out at a given distance from the center (25 meters is a good starting distance). Using the bearings shown, set each stake 25 meters from the center, and label it with a letter of the alphabet. Each student is given a slip of paper, indicating the starting point for the game, and a series of five bearings which he or she is to follow. Figure 9 shows such a course, where the student is told to start at the stake marked "T", and is then directed to follow five bearings to five additional stakes, thus spelling out the word "turkey." Distance plays no factor in this game, just the bearing to follow to the next letter-stake.

For variety, the distance of the stakes from the center can be greatly varied, from 50 meters to a sheet of graph paper. Setting up the game in a wooded area, with bushes, streams, and rocks will make it much more challenging than an open field.

[8]Instruction cards and answer sheets for this game are available in *Schoolyard Compass Game*, Silva Ltd., Willowdale, Ontario and Silva Co., La Porte, Indiana.

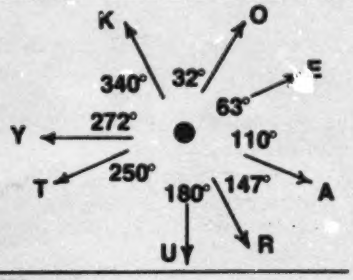


Figure 8

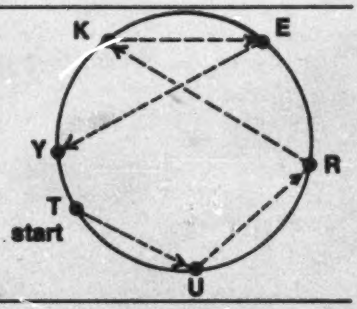


Figure 9

100-Meter String Game

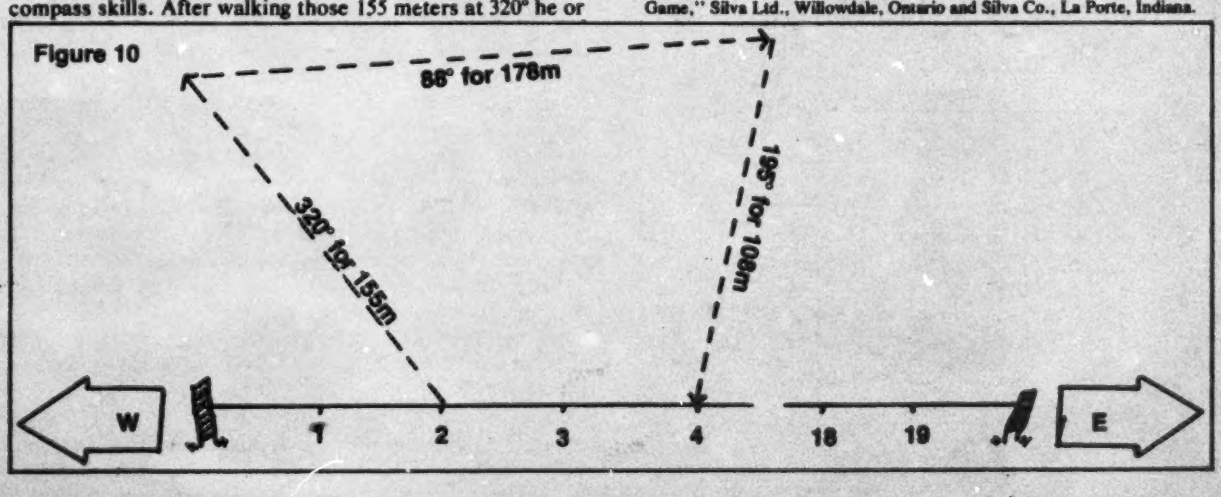
The triangle and compass rose games will give the student experience in setting his or her compass at given bearings, and then following those bearings on the ground. The missing element so far is estimation of distance, and that's where the 100-meter string game comes in. As shown in Figure 10, a string is stretched between two stakes, due East and West, with a marker every five meters. To begin, the 100-meter string is used to estimate the pace of the student. A pace represents two steps, and can easily be measured by counting how often the right foot touches the ground over a given distance. If it takes a youngster 100 of these paces (double steps) to walk the 100-meter string, his or her pace is then 100 paces per 100 meters, or 1 meter per pace.

In operation, the student is given a starting point, and then he or she is given three routes to follow, each with a bearing and a distance to proceed. After three legs, he or she is back on the 100-meter string, and marks down the point of arrival. The three legs are of different lengths, and the student does not arrive back at the starting point. Take Figure 10 for example: the student is directed to start at point #2, and follow a bearing of 320° for 155 meters. He or she must combine the ability to measure distance over the ground with compass skills. After walking those 155 meters at 320° he or she stops, gets a second distance and direction from the game card, and proceeds. Finally, after the third leg, he or she arrives back at the string at point #4. The student should be given an answer card[9] indicating where he or she should have arrived for that given route, and points are deducted according to the accuracy of the student's bearings and distance calculations.

For variations, the game may be set up in a wooded area: thick trees, fences, streams, and boulders make keeping a straight line course much more of a challenge. Stretching the string downhill, uphill, or across a steep slope can be challenging as well. Distances will vary greatly when placed uphill and downhill, and accuracy will suffer unless the student compensates. In an open field at night, with flashlights, students will find the game quite challenging. Competitive aspects can be easily added by having the students compete with one another or with the clock. Points are deducted according to how long it takes to do the three-leg route. Both accuracy and speed are important in this game.

[9]The teacher can construct rough answer cards using a protractor and ruler from a scale drawing such as is shown in Figure 10. Accurate calculations of assigned trails, score cards, etc. are available in "A Competitive Compass Game," Silva Ltd., Willowdale, Ontario and Silva Co., La Porte, Indiana.

Figure 10



Point-to-Point Game[10]

In the point-to-point compass game, distance and direction are combined, as in the 100-meter string game. A course should be set up in a wooded area, though a school campus can be used. Markers are attached to trees, rocks, fenceposts, and building corners, identifying the number of the point, and giving the directions to the next point in degrees and distance.

Look at Figure 11 for an example: The start (S) directs the student to follow a bearing of 72° for 50 meters to find the first point. That point has directions to the next point (290° for 75 meters), and so on. The distances can be as large or as small as you choose depending on the amount of time available. (For smaller children, distances should be relatively short to maintain interest.) The directions to the next point can be varied as well. Marker 8 might read, "Follow a bearing of 55° to the big rock along the roadside." The student does not know the distance to the road, just the bearing. Or perhaps the object is a large tree which he or she can see at a bearing of 160°. Again no distance is given, just the bearing.

In a competitive situation, each of the markers on the trees with directions to the following point is coded. Each marker might be a different color, or have a code letter written on it. As the student moves through the course, he or she writes down these code letters or code colors, to prove that he or she has found the point. The person with the fastest time around the course, with all the points confirmed, is the winner. Rough terrain, longer distances, and thickly wooded areas all serve to increase the difficulty of this game for older students. For young children, the distances should be short, and the markers at each point can be easily seen colored streamers. It should be noted that this game requires no sophisticated materials. In a situation where no map is available, students can still get outdoors, use their compasses, and find their way through a wooded area successfully. In addition, compass skills and the ability to estimate distances are also strengthened.

[10]Adapted from *Be Expert With Map and Compass* by Bjorn Kjellstrom, Charles Scribner's Sons, New York, N.Y. 1975.

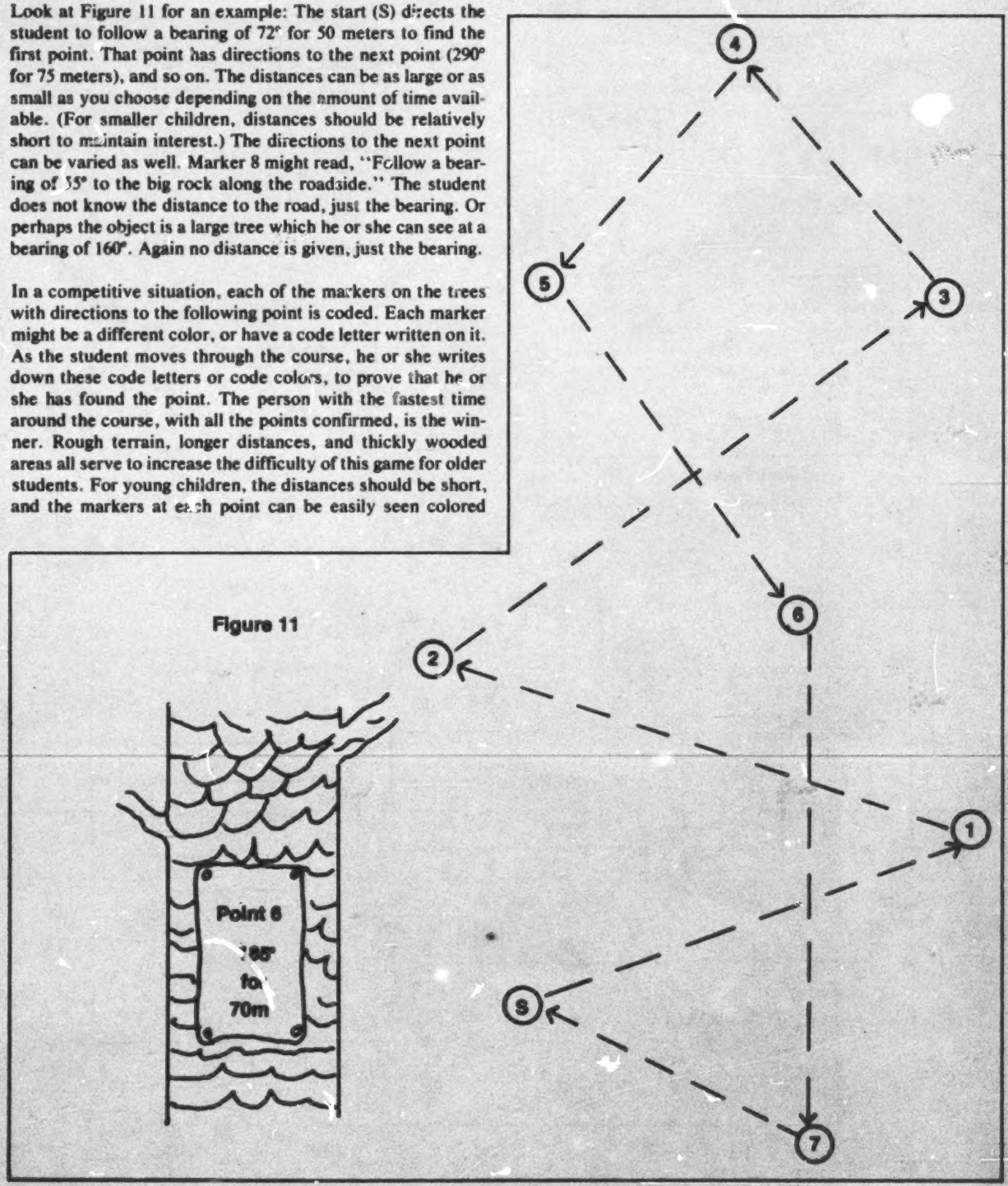


Figure 11

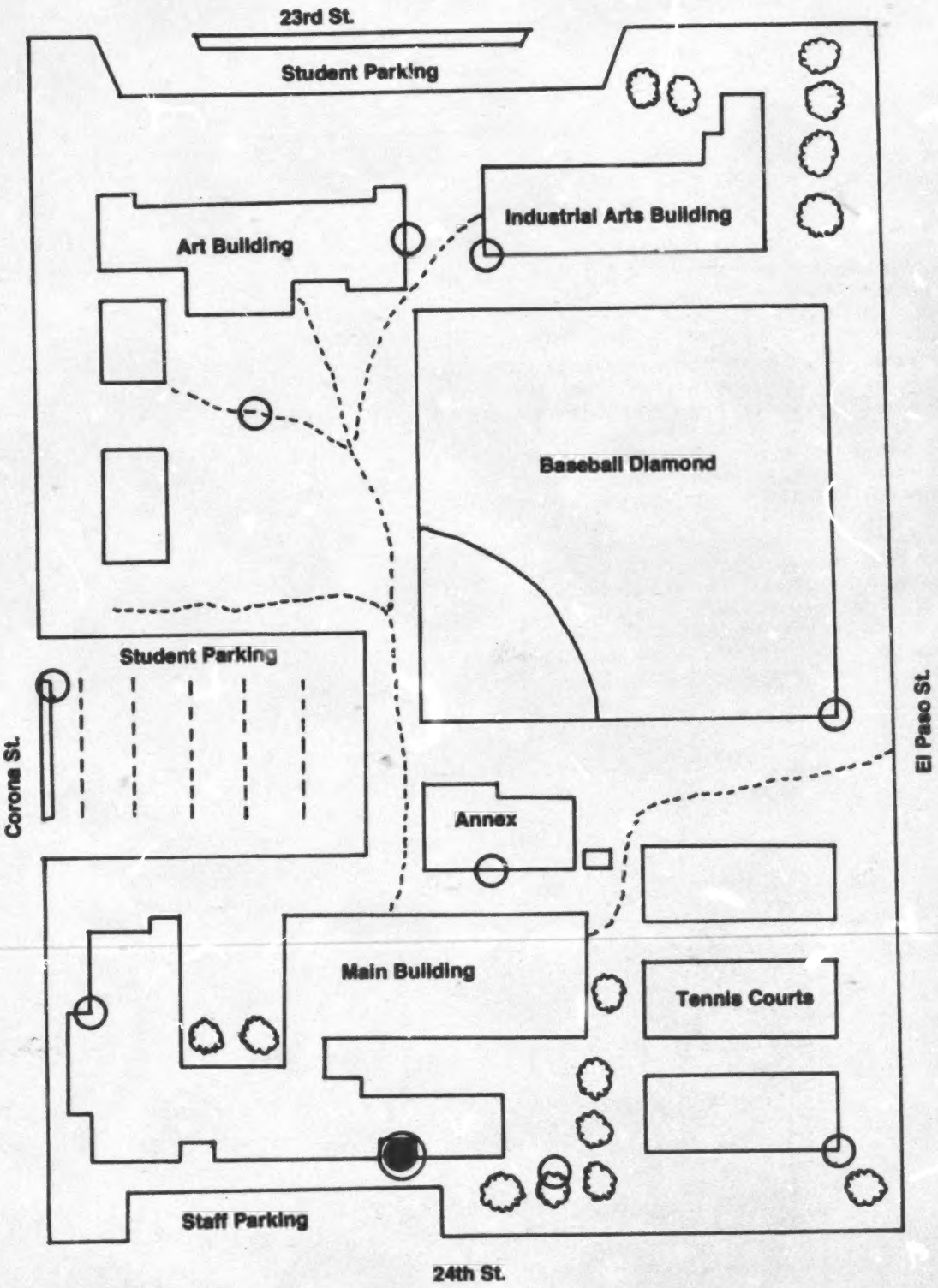

23rd St.
Student Parking
Industrial Arts Building
Art Building
Baseball Diamond
Student Parking
Corona St.
El Paso St.
Annex
Main Building
Tennis Courts
Staff Parking
24th St.

Figure 12

ORIENTEERING

To this point the games described have concentrated on the use of maps or compasses, but the two have not been combined. When you do combine map with compass, and ask students to find their way over terrain using map and compass skills, you have the sport of Orienteering.

Orient Your Map Game

Figure 12 represents a sample map of a school campus. The map is not highly sophisticated, and structures have been drawn only to an approximate scale. Similar maps can be drawn of the interior of a large room, the interior of a building, or of an area of several blocks surrounding a school. In the game the student is supplied with a copy of the map, and asked to locate points circled on a master map.

To begin, then, he or she must transfer these circles as shown in Figure 12 onto a blank map. Each point circled on the map has a letter-coded marker for the student to find. The markers can be large and clearly hung for youngsters, smaller and harder to find for older students. The route choice can be left to the student as in Figure 12, or the points can be numbered and a certain sequence required. The compass is used to orient the map, that is, to make it reflect reality. If there is a cluster of trees on the right side of the map, then the correctly-oriented map will show the trees on the right-hand side of the map. No complex compass skills are used, just the technique of orienting the map. This game has worked well with adults on a college campus with 3 × 5 cards for markers, and with elementary students in an auditorium with Green Stamps as markers. The possibilities are endless.

The competitive aspects of this game are clear: fastest time with all the correct points wins. Note that a sophisticated map is not required; contour lines, accurate scales, and very specific details are not necessary.

Score Orienteering Game

The same kind of map could be used in Score Orienteering as well; the number of points to be found can be greatly increased and placed in positions harder to locate than others (hard-to-find points have higher point values). The student can be given a card which indicates the relative value in points of each of the markers to be located. A specific time limit is given (e.g., 30 minutes) with points deducted for going over the time limit (e.g., one point penalty for each 15 seconds late). The purpose of the game is to see who can gather the highest point value in the time limit prescribed.

The skills are the same, but the focus of the game changes. The question becomes: "I can get three five-point markers really quickly on the south side of the campus but would it be better to try for that one 25-point marker way out on the other side of the campus?" In addition to map and compass skills, a whole series of judgement decisions is now called for, involving how fast the student can run, how far the distance is, how long it will take, and how tired he or she will be after covering the distance. "Is it worth coming in four minutes late for an extra 10-point marker?" That is the kind of problem solving involved in this type of schoolyard Orienteering.

Cross-Country Orienteering

Most of the games described so far have been compromises to a certain extent. What can you do with a compass but no map? What about a map and no compasses? What about compasses, but a roughly drawn schoolyard map? Well, if you have compasses and a good topographic map, then you're ready for cross-country Orienteering.

Much like the two games above, the point is the same: Find a series of markers shown on a master map, and do it as quickly as possible. Take a look at the map and route shown in Figure 5 as a good example. Figure 5 is exactly what the student would see on a master map: a series of markers to be found, and a route to follow to find them. The student transfers this information onto his or her copy of the map, and is off.

In setting up this kind of an Orienteering course, the teacher should keep a number of things in mind. First, the point is not to hide the markers so they can't be found! Actually, the markers should be relatively easy to find; the problems for the student should occur between the markers in the choice of various routes. Look at the first leg of the course in Figure 5. Starting from the triangle, heading to marker #1, the student should see two immediate choices: a straight-line route right up the steep slope in front of him or her, or around to the East to follow the road up the valley and take the first fork to the left. This is what cross-country Orienteering is about—making the correct choices based on the ability to read a map and use a compass.

As with most of the other games mentioned above, the markers should be coded with a letter, number, or color so that the student can prove he or she has made it to each checkpoint. A score card for such a course should include starting and finishing times and spaces to write in code words, numbers, or colors to prove the student found the marker.

Setting up courses like the one shown in Figure 5 can be exciting, but also rather difficult. To stay out of difficulty, in a sophisticated area, remember a few simple things: don't hide the markers; make sure there are choices of routes between each marker; and make it fun for your students!

Sources and Materials

American Orienteering Service, Box 547, La Porte, Indiana. (A list of related 16mm films, filmstrips, and informative pamphlets is available.)

Disley, John. *Your Way With Map and Compass*. Canadian Orienteering Service, Willowdale, Ontario. 1973. (Comes with a series of plastic overlays and sample maps. A good text for student use, grade 6 and up.)

Kjellstrom, Bjorn. *Be Expert With Map and Compass*. Charles Scribner's Sons, New York, N.Y. 1975. (An excellent text for upgrading your own skills as an instructor; gives specific instructions on the use of the compass.)

Silva Company, 2466 State Road 39 North, La Porte, Indiana. (Compasses, texts, and training aids for teaching map and compass skills are available.)